having a plurality of gas flow passages defined by walls, to which the metal anchor layer is applied.

Dependent claims have been amended to revise their dependencies, including dependencies on new claims 46 and 47.

Objection To The Disclosure

The Examiner has objected to the disclosure with respect to the amended first full paragraph appearing on page 16. The objection is to the reference to the photomicrographs of renumbered Figures 2A-2C showing the roughened surface existing after an anchor layer has been electric-arc sprayed thereon. The Examiner states:

> "However, since the original Figures 2A-2D, which are supposed to be the above mentioned photomicrographs, were not included, it is unclear how the above statement can be verified. Appropriate correction is required."

It is respectfully pointed out that original Figures 2E, 2F and 2G, now renumbered per the 9/27/00 amendment as Figures 2A, 2B and 2C, show the same type of roughened surface attained by electric-arc spraying as did the original Figures 2A-2C. The statement thus applies to renumbered Figures 2A, 2B and 2C. Specifically, as described in the amended paragraph on page 16, renumbered Figures 2A, 2B and 2C show an electric-arc-sprayed nickel aluminide anchor layer 110 at the indicated magnifications and illustrate the roughened surface obtained by electric-arc spraying.

Further, Applicants are unaware of any requirement that an assertion in the specification must be "verified" by a showing in a drawing.

Rejection Of Claims 22-25 Over Ishida et al '281 Under 35 USC 102

Claims 22-25 have been rejected under 35 USC 102(b) as being anticipated by Ishida et al U.S. Patent 4,455,281 ("Ishida et al '281"). The Examiner notes that Ishida et al '281 discloses making a NO_x reduction catalyst unit by spraying of molten metal onto the surface of a metal plate to allow the molten metal to accumulate thereon to provide rough surfaces on which a catalytic material is deposited. Claim 1 of Ishida et al '281 is cited for this showing. Among the disclosed methods for spraying the molten metal are "contact resistance of electricity, electric arc or high temperature flames." The Examiner notes that Ishida et al '281

prefers as the molten metal to be sprayed the same type of material as the metal plate, and that a catalytic substance is attached to the roughened surfaces of the metal plate by molten metal spraying, citing column 4, line 62 to column 5, line 13 of Ishida et at '281.

The Examiner equates the rough surfaces disclosed in Ishida et al '281 to the "irregular surface configuration" of Applicants' claim 25.

The Examiner notes that the catalytic substances of Ishida et al '281 may be coated on the surfaces of the metal plate as a paste or by dipping the metal plate into a slurry, citing column 5, lines 24-30. This aspect of the disclosure is applied to Applicants' claim 23, which calls for application of a catalytic material by means other than electric-arc spraying.

The Examiner then concludes that the catalyst of Ishida et al '281 anticipates the claimed catalyst.

<u>This ground of rejection is respectfully traversed.</u>

Ishida et al '281 at column 2, line 28 *et seq*, briefly summarizes its disclosed invention as one which provides a method of producing a catalyst unit for NO_x reduction in exhaust gas

> "wherein: molten metal is sprayed upon <u>surfaces of a metal plate</u> allowing the molten metal to accumulate thereon to form rough surfaces; and the rough surfaces thus obtained are deposited with a catalytic substance for NO_x reduction of exhaust gas." (Emphasis added.)

The method of the Ishida et al '281 invention is described at column 2, line 38 *et seq* as being characterized in that:

> "molten metal is sprayed on both surfaces of <u>a perforated metal plate</u> allowing the molten metal to accumulate thereon to form rough surfaces; the rough surfaces thus obtained are deposited with a catalytic substance for NO_x reduction of exhaust gas; and layers of catalytic substance disposed <u>at opposite sides of the metal plate</u> are jointed to each other through perforations." (Emphasis added.)

As disclosed in the drawings and referenced elsewhere in Ishida et al '281 (e.g., column 4, line 62 *et seq*), Ishida et al '281 is concerned with roughening the surfaces of metal plates by spraying molten metal onto the plates. The Ishida et al '281 invention is described (column 6,

lines 31-45) as embracing metal plates of a variety of shapes, which may be, in some cases, perforated.

Ishida et al '281 does not disclose or suggest the application of an electric arc-sprayed metal layer upon a carrier substrate of reticulate configuration as now defined in claim 22.

Ishida et al '281 therefore simply discloses spraying onto metal plates a molten spray of metal, which is preferably the same metal as that of the plate, in order to roughen the surface of the plates to receive a catalytic material. As illustrated in Figures 1 and 2 of Ishida et al '281, a plurality of such plates are then stacked to provide spaces therebetween through which the gas to be treated may flow.

Ishida et al '281 thus instructs the art only with respect to roughening the surface of metal plates to retain a catalytic material thereon. There is no showing or suggestion that such bonding or anchor surfaces may be applied to a reticulate substrate, as now defined in claims 22-25. The term reticulate configuration means and includes woven or non-woven mesh, wadded fibers and foamed or otherwise reticulated or lattice-like three-dimensional structures. See, for example, page 10 of Applicants' specification, wherein it is stated that

> "Open substrates may be provided in a variety of forms and configurations, including honeycomb-type monoliths, woven or non-woven mesh, wadded fibers, foamed or otherwise reticulated or lattice-like three-dimensional structure, etc."

As evidenced by renumbered Figures 2A through 2F (originally numbered as Figures 2E through 2J), the electric-arc spraying provides roughened surfaces even on the fine web-like members of a reticulate substrate. The application of an electric-arc-sprayed coating onto such reticulate substrates is counter-intuitive, as it would be expected that the sprayed molten metal would occlude the fine openings and passageways defined between the web-like members.

Similarly, with respect to new claims 46 and 47, wherein the substrate is defined as a honeycomb carrier substrate having a plurality of gas-flow passages extending therethrough, it is counter-intuitive and surprising that electric-arc spraying of molten metal can successfully be carried out on such carriers without occluding the fine gas-flow passageways. Such honeycomb carriers typically have from 100 to 400 or more such gas-flow passages per square inch of inlet and outlet face. Applicants have discovered that electric-arc spraying can deposit the roughened metal surface on the walls of such small gas-flow passageways without occluding the same.

Accordingly, in view of the claims as amended and presented herein, Ishida et al '281 does not sustain a rejection under 35 USC 102(b), which requires that each aspect of the rejected claim be shown by the reference. Ishida et al '281 fails to show application of a molten metal anchor layer to reticulate or honeycomb substrates.

Rejection Of Claims 22-33 and 40-44
Under 35 USC 103 Over Ishida et al '281 and Fukui et al '455

Claims 22-33 and 40-44 have been rejected under 35 USC 103(a) as being unpatentable over Ishida et al '281 in view of Fukui et al U.S. Patent 5,569,455 ("Fukui et al '455"). (In this portion of the office action the Examiner repeatedly refers to "Fukui '281." The following discussion proceeds on the basis that Fukui '455 was intended.) Ishida et al '281 is cited for disclosing a process for making a catalyst unit for NO_x reduction in exhaust gas in which thin steel plates (citing column 4, lines 58-61 of Ishida et al '281) are sprayed with a molten metal which preferably is the same material as the metal plate, citing column 5, lines 9-10. The amount of aluminum and nickel in the molten metal sprayed is not the same as that defined in some of the rejected claims, but the Examiner states this "can be optimized to provide the best results."

The Examiner acknowledges that Ishida et al '281 does not specifically disclose the arc temperature, but again states that it would have been obvious to one of ordinary skill in the art to optimize the arc temperature to produce the rough surfaces as desired in Ishida et al '281.

The Examiner then states that "In the event that Ishida '281 does not disclose a catalytic material comprising a refractory metal oxide support on which one or more catalytic components are dispersed" Fukui et al '455 may be applied as follows. The abstract of Fukui et al '455 is cited for its showing of making a catalytic bonding layer on catalyst structures. The disclosed catalyst is used to purify exhaust gases which contain HC, CO and NO_x, citing column 1, lines 18-24. Fukui et al '455 is then cited for the application of porous alumina on the upper surface of the bonding layer, after which a process of competitive absorption was carried out to provide catalytically active components which, after drying, sintering and activation, provided the catalyst layer in finished form. Claim 8 of Fukui et al '455 is cited for the showing that the substrate can be a honeycomb metallic substrate.

From this the Examiner concludes that it would have been obvious to one of ordinary skill in the art to form the catalyst layer in Ishida et al '281 by the process suggested by Fukui et al '455. The stated rationale is that such catalyst layer is desired in an analogous application,

and to use a honeycomb, which the Examiner states is considered to be the same as the claimed "foam", is suggested by Fukui et al '455 in order to improve the surface area of the formed catalyst.

With respect to claims 27 and 40-44, Ishida et al '281 is cited for disclosing that the catalyst unit is incorporated within the catalyst reactor as shown in Figure 1, which has an inlet and an outlet and a plurality of fluid flow paths therebetween.

These grounds of rejection are respectfully traversed.

What the art relied upon by the Examiner does not show or suggest is the deposition by electric arc spraying of an anchor layer onto a reticulated substrate. It is noted that Fukui et al '455 teaches forming a catalytic bonding layer by chemical vapor deposition in order to provide a bonding layer which can also be electrically energized to promote catalytic conversion activity by pre-heating of the catalyst. See the Abstract of Fukui et al '455. At column 3, line 52 *et seq*, Fukui et al '455 discloses a ceramic honeycomb structure catalyst carrier to which a catalyst is adhered via a bonding layer, which may be electrically conductive, which bonding layer is formed on the ceramic carrier by chemical vapor deposition. At column 6, line 56 *et seq*, deposition of the bonding layer is described as being carried out by any one of a number of chemical vapor deposition methods, with a preference expressed for thermal chemical vapor deposition. Among the reasons for this preference is reason (5), set forth at column 7, line 2 *et seq,* that the reactive gas of the chemical vapor deposition process "can enter blind spots well, if the process is conducted at a relatively low pressure."

Fukui et al '455 thus teaches the art that in order to coat the interior gas flow passages of a monolithic honeycomb substrate, thermal chemical vapor deposition at low pressure is used to enhance the ability of the vapor to penetrate into "blind spots", i.e., into the long, very small diameter gas flow passages of a typical honeycomb carrier. The same would apply to applying a metal coating to the interior passages of a reticulate substrate. Fukui et al '455 thus teaches away from the Applicants' invention which embraces electric arc deposition of a metal anchor layer into such "blind spots". Instead, Fukui et al '455 instructs the art that chemical vapor deposition is to be utilized to deposit the desired metal layer within the "blind spots". Fukui et al '455 therefore clearly does not supply the deficiencies of the other art relied upon, as discussed in detail above.

In contrast, Applicants' claim 22 defines electric arc spraying used to apply the metal anchor layer to a reticulate substrate and newly presented claims 46 and 47 define application

of the metal anchor layer to the walls of the gas flow passages of a honeycomb monolith carrier.

Rejection Of The Claims Under 35 USC 103(a)
<u>Over Gorynin et al, Rondeau and Ishida et al '281 et al</u>

Claims 22-33 and 40-44 have been rejected under 35 USC 103(a) as being unpatentable over Gorynin et al U.S. Patent 5, 204,302 ("Gorynin et al '302") in view of Rondeau U.S. Patent 4,027,367 ("Rondeau '367") and Ishida et al '281.

Gorynin et al '302 is cited for disclosing a catalyst comprising a metal substrate, an adhesive sub-layer diffusion bonded onto said substrate, a catalytically active layer deposited on said sub-layer, and a porous layer deposited on said catalytically active layer. The Examiner further cites the various metals disclosed as comprising the thermally reactive powders for the sub-layer of Gorynin et al '302, citing column 2, lines 25-35. With respect to "the composition of the Ni alloy used" (presumably, that defined in Applicants' claims 28-30) the Examiner contends that it would have been obvious to one of ordinary skill in the art to optimize such composition to obtain the best adhesive layer. The Examiner than notes that, as disclosed at column 1, lines 6-10 of the reference, the catalyst can be used for purification of waste gases.

The Examiner acknowledges that the adhesive layer in Gorynin et al '302 is formed by plasma spraying and cites the teaching that the heat generated in the plasma reaction results in a diffusion bond and strong adhesion of the sub-layer to the substrate, citing column 3, lines 6-15 of Gorynin et al '302. The Examiner acknowledges, at the top of page 6 of the office action, that Gorynin et al '302 does not disclose the use of an electric arc to form the adhesive layer.

Rondeau '367 is cited by the Examiner as disclosing a method of thermal spraying a substrate to deposit a self-bonding coating on the substrate, including supplying an electric arc thermal spray gun with a wire feed comprising an alloy of nickel and aluminum or titanium. The Examiner points out that Rondeau '367 discloses that several types of thermal spraying guns are available, including combustion flame spray guns, e.g., the oxy-fuel gas type, plasma arc spray guns, and electric arc spray guns. As noted by the Examiner, Rondeau '367 describes the advantages of using electric-arc spraying to provide a self-bonding coating upon a substrate. Starting with the second paragraph at page 8 of the office action, the Examiner summarized the advantages proclaimed in Rondeau '367 for use of an electric-arc spray gun in the Rondeau process, citing the paragraph bridging columns 2-3 of Rondeau '367.

Citing column 4, lines 15-20 of Rondeau '367, the Examiner refers to the teaching of the wire alloy comprising a minimum of 93 percent nickel, from 4 to 5.2 percent aluminum, and from 0.25 to 1.00 percent titanium.

The Examiner then concludes that it would have been obvious to one of ordinary skill in the art to use electric-arc spraying method, instead of plasma spraying, to form the adhesive layer in Gorynin et al '302 as suggested by Rondeau '367. The stated reason is that the electric-arc spraying method can form the same diffusion bond between the two layers, but it would cost less, plus the additional advantages noted in Rondeau '367.

Apparently in support of the foregoing rejection, the Examiner states (in the third full paragraph at page 9 of the office action) that Ishida et al '281 is applied as previously to teach that it is known in the art to form an adhesive layer on a substrate of a catalyst by using an electric-arc spraying process before depositing the catalytic layer, citing column 7, lines 62-67 of Ishida et al '281. That reference is also applied to teach that the catalyst is used in a catalytic reactor, as shown in Figure 1 of Ishida et al '281, which has a plurality of fluid flow paths between an inlet and an outlet.

The foregoing grounds of rejection are respectfully traversed.

It is to be noted that Rondeau '367 is entirely silent with respect to utilizing such coating as an anchor layer for a catalytic material as defined in Applicants' rejected claims. Instead, as described at column 1, lines 14-19, Rondeau describes the use of thermal-sprayed coatings

> "for protecting substrates for cryogenic or refractory purposes, for parts repair, for protection of a substrate from oxidizing or from other hostile environments, and for many other purposes."

There is thus no suggestion made to the art that the thermal-spray coatings of Rondeau '367 have utility as an anchor layer for catalytic materials. There is only a reference to protective coating and parts repair, and a general reference to "many other purposes."

Rondeau '367 Teaches Away From the Claimed Invention It should also be noted that Rondeau '367 is critical of low-temperature applications, such as combustion flame spray guns, because "the temperatures produced therein are usually relatively low and often incapable of spraying materials having melting points exceeding 5,000° F." (See column 1, lines 25-32.) In this regard, it is to be noted that, as disclosed for example, at page 14, lines 10-22 of the specification, the Applicants disclose that the temperature of the molten feed stock

utilizing the electric arc spray technique claimed by the Applicants "is expected to be at a temperature of not more than about 5,000° F, preferably in the range of 1,000 to 4,000° F, more preferably, not more than about 2,000° F." The Applicants then continue on to state that the low temperature is believed to be responsible for the especially uneven surface of the anchor layer, because the sprayed material pools on the substrate to its freezing temperature so quickly that it does not flow significantly on the substrate surface and therefore does not smooth out.

Rondeau '367 thus teaches away from the claimed invention in teaching the art that relatively low temperatures are disadvantageous.

The Modification of Gorynin et al '302 (Plasma Spraying) With Rondeau '367 (Electric Arc Spraying) In the second full paragraph on page 9 of the office action, the Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to use an electric arc spraying method, instead of plasma spraying, to form the adhesive layer in Gorynin et al '302, as suggested by Rondeau '367.

<u>That ground of rejection is respectfully traversed.</u>

It is respectfully drawn to the Examiner's attention that Gorynin et al '302 emphasizes that the high temperature attained by plasma spray techniques is what "causes diffusion of the sublayer into the substrate, resulting in a diffusion bond and strong adhesion of the sublayer to the substrate." (See column 3, lines 6-15.) It contravenes the specific teaching of Gorynin et al '302 as to the desirability and advantages of the high temperatures attained by plasma spraying to modify Gorynin et al '302 to use the low-temperature electric-arc spray of Rondeau '367 in Gorynin's method. In this regard, it is to be noted that the Applicants' specification points out that a metal substrate having a metal intermediate layer which has been plasma-sprayed thereon, and having a catalytic material applied to the metal layer, has been shown to <u>fail</u> to retain the catalytic material in place. See the discussion starting at page 13, line 21 of Applicants' specification. As pointed out starting at page 14, line 1 of Applicants' specification, the Applicants have made the surprising discovery that electric arc spraying of a metal onto the substrate results in a superior bond, as compared to high-temperature plasma spraying.

It is also to be noted that Gorynin et al '302 teaches that the catalytic material itself is to be applied by the plasma spray technique.

The Combination of Gorynin et al '302 With Rondeau '367 is Improper In order to modify Gorynin et al '302 by the electric arc-spray teaching of Rondeau '367, as has been done

by the Examiner, one must contravene the explicit teachings of Gorynin et al '302 that the high temperature attained by plasma spraying (which Rondeau '367 notes may be as high as 30,000° F, see column 1, lines 32-35). The combination of Gorynin et al '302 with Rondeau '367 is therefore is not a proper combination to sustain a rejection under 35 USC 103. To make a proper combination of references under 35 USC 103, the suggestion to combine references must be found in the references themselves, and not only in the teaching of the Applicants. It is a clear indication of the discredited use of hindsight reasoning that the Examiner seeks to modify Gorynin et al '302 in a manner which is contrary to the explicit teachings of that reference, and which can only have been suggested by the Applicants' teaching. The Applicants' disclosure may not be thus used against them.

The Combination of Gorynin et al '302 With Ishida et al '281 Is Improper As noted above, the Examiner has applied Ishida et al '281's to teach that it is known to form an adhesive layer on a substrate of a catalyst by using an electric arc spraying process before depositing the catalytic layer in order to form a catalyst that is highly resistant to peeling off. In this regard, the Examiner cites column 7, lines 62-67 of Ishida et al '281. It is to be noted that at the place cited by the Examiner, Ishida et al '281 again refers to "a plate-shaped catalyst unit." There is no suggestion in Ishida et al '281 of a applying a metal anchor layer to substrates as defined in the amended and newly presented claims, i.e., on the webs of a reticulate support or within the gas flow passages of a honeycomb support. As is the case with Rondeau '367, the combination of Ishida et al '281 with Gorynin et al '302 is an improper combination, because it requires contravening the unequivocal teaching of Gorynin et al '302 to utilize plasma arc spray in order to attain the benefit of its very high temperatures. Electric arc spraying, as pointed out in Applicants' specification as discussed above, utilizes relatively low temperatures, and the purpose of Gorynin et al '302 would be defeated if the relatively low temperature electric arc spraying of either Ishida et al '281 or Rondeau '367 were to be substituted for the plasma arc spraying of Gorynin et al '302.

Rejection of the Claims Under 35 USC 103(a) Over
A Combination Of Four References, Including Fukui et al U.S. Patent 5,569,455

Claims 22-44 [sic] have been rejected under 35 USC 103(a) as being unpatentable over Gorynin et al '302 in view of Rondeau '367, Fukui et al '455, and Ishida et al '281. (Inasmuch as all claims other than claims 22-33 and 40-45 were withdrawn and are cancelled herein, the rejection must apply, at most, to claims 22-33 and 40-45.) In making this ground of rejection

the Examiner applies Gorynin et al '302, Rondeau '367 and, optionally, Ishida et al '281 as above. The Examiner notes a difference in that Gorynin et al '302 does not disclose a ferritic steel foam.

This ground of rejection is respectfully traversed.

The deficiencies of the Gorynin et al '302, Rondeau '367 and Ishida et al '281 references have been discussed above and are incorporated by reference herein with respect to the rejection in combination with Fukui et al '455.

Fukui et al '455 does not cure the deficiencies of the references with which it is combined, and is cited by the Examiner for its showing of an exhaust gas catalytic purifier comprising a housing containing a catalyst carrier having a substantially uniform electrically energizable bonding layer. The bonding layer is said to have a substantially uniformly formed and sufficiently rough surface to firmly bond a catalyst thereto, and can be a carbide or a silicide having a catalyst layer disposed thereon and "disposed away from said catalyst carrier (note claim 1)." Fukui et al '455 is further cited as disclosing that the carrier can be a honeycomb metallic structure, citing claim 8.

The Examiner concludes that it would have been obvious to one of ordinary skill in the art to use the stainless steel, i.e., ferritic steel, substrate material disclosed in Gorynin et al '302 in a honeycomb structure as suggested by Fukui et al '455 in view of the fact that a higher surface area is desired. The honeycomb structure, which the Examiner states is considered to be the same as the claimed foam, would increase the surface area of the catalyst.

This ground of rejection is respectfully traversed.

This ground of rejection appears to be directed at dependent claim 31, which defines a method in which the substrate comprises a ferritic steel foam.

There is no basis for the Examiner to arbitrarily contend that the honeycomb structure of the prior art is the same as a ferritic steel foam. Further, as pointed out above, Fukui et al '455 utilizes chemical vapor deposition to apply the metal layer, and one of the stated reasons for utilizing chemical vapor deposition at low pressure is the ability to thereby coat "blind spots", as discussed above. Applicants have discovered, and claimed, a method whereby electric-arc spraying, with its benefits of relatively low temperature and the ability to spray alloys, e.g., by utilizing a two-wire gun, may nonetheless be used to satisfactorily coat "blind spots" presented by reticulate substrates and the fine gas-flow passages of honeycomb-type carriers.

Rejection Of Claims 40 And 44 Under 35 USC 103(a)

Claims 40 and 44 have been rejected under 35 USC 103(a) over Gorynin et al '302 in view of Ishida et al '281.

Gorynin et al '302 is applied as above, the Examiner noting that this reference uses plasma spraying to form an anchor layer. The Examiner acknowledges that Gorynin et al '302 does not disclose the step of reshaping the substrate to conform it to the container. Ishida et al '281 is applied as above to teach the use of the catalysts disposed in a catalytic reactor.

This ground of rejection is respectfully traversed.

Ishida et al '281 discloses the use of conventional rigid substrates. Neither Ishida et al '281 nor the other art of record nor any other art of which Applicants are aware shows or suggests the use of a pliable substrate which, after application of the anchor layer or anchor layer plus catalysts thereto, can be bent or otherwise shaped to conform to the container in which it is placed. The prior art would not adopt such a technique because the act of bending or conforming the substrate would inevitably cause the catalytic layer or the anchor layer carrying it to spall, thus removing catalysts from the substrate and discharging catalyst particles into the gas stream being treated. Applicants have discovered that the application of an electric-arc-sprayed anchor layer, even to a pliable reticulate substrate, provides such outstanding adherence that the pliable substrate may be reshaped and conformed to a desired shape without spalling of the anchor layer and catalytic material therefrom.

The Examiner is respectfully requested to point out where the prior art of record, or any other art, shows or suggests that an anchor layer on which a catalytic material may be placed to adhere to a pliable substrate, enables bending of the pliable substrate as desired to conform it to a particular shape, e.g., the shape of the container which receives it. Applicants have discovered that the electric-arc-sprayed rough metal coating provides such superior adherence that a pliable substrate may be bent and formed without spalling or peeling the metal anchor layer, and therefore the catalyst disposed thereon, from the substrate. There is no basis in the art of record, or any other art of which Applicants are aware, to contend that the method defined in rejected claim 40 is anticipated or rendered obvious by the art.

* * *

In view of the foregoing, reconsideration and withdrawal of the rejection and allowance of each of the claims as now presented is respectfully requested.

Respectfully submitted,

Victor E. Libert
Registration Number 24,224
Attorney for Applicants

Correspondence to:
Chief Patent Counsel
Engelhard Corporation
101 Wood Avenue
P.O. Box 770
Iselin, NJ 08830-0770
Telephone: Richard A. Negin (732) 205-6241
Facsimile: (732) 205-6727

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COPY OF CLAIMS SHOWING AMENDMENTS
(Deleted material is enclosed in boldface brackets
and added material is underlined and in bold face.)

22. (Amended) A method for manufacturing a catalyst member comprising:

depositing by electric arc spraying a metal feedstock onto **an open carrier** [a] substrate **of reticulate configuration,** to provide a metal anchor layer of the substrate, and

depositing a catalytic material onto the [substrate] **anchor layer**.

23. (Amended) The method [of claim 22] **of any one of claims 22, 27, 40, 46 and 47** comprising depositing the catalytic material by means other than electric arc spraying.

25. (Amended) The method [of claim 22] **of any one of claims 22, 27, 40, 46 and 47** comprising electric arc spraying a molten metal feedstock at a temperature that permits the molten metal to freeze into an irregular surface configuration upon impinging on the substrate surface.

27. (Amended) A method for manufacturing a catalyst member comprising:

electric arc spraying a metal feedstock onto at least one **open carrier** substrate **of reticulate configuration,** to provide at least one [anchor layer-coated] substrate **having an anchor layer coated thereon**;

depositing onto the **anchor layer** [at least one anchor layer-coated substrate] a catalytic material comprised of a bulk refractory metal oxide having dispersed thereon one or more catalytically active components to provide at least one catalyzed substrate; and

incorporating the at least one catalyzed substrate into a body configured to define an inlet opening and an outlet opening and so configuring and disposing the at least one catalyzed substrate between the inlet and outlet openings to define a plurality of fluid flow paths therebetween.

28. (Amended) The method of any one of claims [22-27] **<u>22, 27, 40, 46 and 47</u>** wherein the anchor layer is deposited by electric arc spraying a metal feedstock selected from the group consisting of nickel, Ni/Cr/Al/Y, Co/Cr/Al/Y, Fe/Cr/Al/Y, Co/Ni/Cr/Al/Y, Fe/Ni/Cr, Fe/Cr/Al, Ni/Cr, Ni/Al, 300 series stainless steels, 400 series stainless steels, Fe/Cr and Co/Cr, and mixtures of two or more thereof.

31. (Amended) The method of any one of claims [22 through 27] **<u>22, 27, 40, 46 and 47</u>** wherein the substrate comprises a ferritic steel foam.

40. (Amended) A method for manufacturing a catalyst member to conform to a mounting container, comprising:

depositing an anchor layer onto a pliable substrate to provide **<u>a substrate having</u>** an anchor layer coated [substrate] **<u>thereon</u>**;

depositing a catalytic material onto the **<u>anchor layer</u>** [substrate]; and

reshaping the **<u>pliable</u>** substrate to conform <u>it</u> to the container after depositing at least the anchor layer thereon.

43. (Amended) The method of claim 40, claim 41 or claim 42 comprising reshaping the substrate after depositing the catalytic material [thereon.] **<u>onto the anchor layer.</u>**